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The Relationship of Functional Limitations and Disability with Clinical Symptoms in Patients with Temporomandibular Disorder: A Cross-Sectional Clinical Study

Temporomandibular Bozukluğu Olan Hastalarda Fonksiyonel Kısıtlılık ve Sakatlığın Klinik Semptomlarla İlişkisi: Kesitsel Bir Klinik Çalışma

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ABSTRACT Objective: Temporomandibular disorder (TMD), a musculoskeletal disease, especially when it becomes chronic, may result in functional limitation and disability. The aim of this study is to evaluate the relationship between functional limitation and disability with sociodemographic characteristics and clinical symptoms in patients with TMD. **Material and Methods:** This cross-sectional, clinical study was conducted on patients diagnosed with temporomandibular joint (TMJ) disorder according to the Diagnostic Criteria for TMDs (DC/TMD) in the oral and maxillofacial surgery clinic of a university. In clinical examination, the patients were evaluated in terms of pain, maximum mouth opening (MMO) and joint sounds (click, crepitus). Functional limitation was evaluated with Jaw Functional Limitation Scale-20 (JFLS-20), and disability status was evaluated with Temporomandibular Disability Index (TDI). **Results:** 381 TMD patients (318 females, 63 males) were included in the study. JFLS-20 and TDI scores significantly increased as participants' MMO decreased and TMJ pain level increased ($p<0.001$). Those with joint noise complaints such as clicking and crepitation had higher JFLS-20 and TDI scores than those without ($p<0.001$). In addition, a strong correlation was observed between the MMO, pain, values of the JFLS-20, and TDI scores. **Conclusion:** Clinical symptoms in TMD patients are closely related to functional limitation and disability. Worsening of clinical symptoms in TMD patients causes an increase in functional limitation and disability.

Keywords: Temporomandibular disorder; sociodemographic characteristic; clinical symptom; functional limitation; disability

ÖZET Amaç: Bir kas-iskelet sistemi hastalığı olan temporomandibular bozukluğu (TMB), özellikle kronikleştiğinde fonksiyonel kısıtlılığa ve sakatlığa neden olabilir. Bu çalışmanın amacı, TMB hastalarında fonksiyonel kısıtlılık ve sakatlık ile sosyodemografik özellikler ve klinik belirtiler arasındaki ilişkiyi değerlendirmektir. **Gereç ve Yöntemler:** Bu kesitsel klinik çalışma, bir üniversitenin ağız, diş ve çene cerrahisi kliniğinde TMB tanı kriterlerine (TK/TMB) göre temporomandibular eklem (TME) bozukluğu tanısı alan hastalar üzerinde gerçekleştirildi. Klinik muayenede hastalar eklem ağrısı, maksimum ağız açıklığı (MAA) ve eklem sesleri (klik, krepitus) açısından değerlendirildi. Fonksiyonel kısıtlılık Çene Fonksiyonları Sınırlama Ölçeği-20 (ÇFSÖ-20) ile sakatlık durumu ise Temporomandibular Sakatlık İndeksi (TSİ) ile değerlendirildi. **Bulgular:** Çalışmaya 381 TMB hastası (318 kadın, 63 erkek) dâhil edildi. Katılımcıların MAA'sı azaldıkça ve TME ağrı düzeyi arttıkça ÇFSÖ-20 ve TSİ skorları anlamlı düzeyde arttı ($p<0,001$). Klik ve krepitasyon gibi eklem sesi şikâyeti olanların ÇFSÖ-20 ve TSİ skorları olmayanlara göre daha yüksekti ($p<0,001$). Ayrıca MAA, ağrı, ÇFSÖ-20 değerleri ve TSİ skorları arasında da güçlü bir korelasyon gözlendi. **Sonuç:** TMB hastalarındaki klinik semptomlar fonksiyonel kısıtlılık ve sakatlık ile yakından ilişkilidir. TMB hastalarında klinik bulguların kötüleşmesi fonksiyonel kısıtlılığın ve sakatlığın artmasına neden olur.

Anahtar Kelimeler: Temporomandibular bozukluk; sosyodemografik özellik; klinik semptom; fonksiyonel kısıtlılık; sakatlık

Temporomandibular disorders (TMDs) are a set of disorders involving the temporomandibular joint (TMJ), masticatory muscles, or both.[1] Specific symptoms of TMD may include pain during jaw movement, restricted mandibular movement, and joint sounds.[2] Pain is the most common symptom of TMDs and the primary reason people seek therapy. It has been reported that 50-70% of the worldwide popula-

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tion experience pain, limited jaw range of motion, and TMJ sounds at some point in their lives.[3] The cause of TMD is considered multifactorial, consisting of physical, psychological, and psychosocial factors, which, alone or in combination, contribute to the predisposition, onset, or persistence of TMD.[4]

TMD may progress chronically if there is constant or recurrent pain. Disability is one of the consequences of chronic pain, and four fundamental disability patterns have been described by several organizations, including the World Health Organization and the Institute of Medicine (IOM). These can be referred to as "pathophysiology," "disorder," "functional limitation," and "disability," albeit terminology varies. The first two components are objectively evaluated indicators of illness state, in contrast, the following two are subjectively evaluated indices of disease effect, and all levels of evaluation-objective and subjective-are equally valid and necessary for disability assessment. Impairment refers to the measured change in function caused by the specific pathophysiology of a target organ system, functional limitation refers to the organ-level impact, and disability refers to the individual-level impact.[5] TMDs cause functional limitations as well as psychological disability. Various scales have been proposed to measure limitations or disability associated with jaw function.

TMD, a musculoskeletal disease, may result in functional limitation and disability. While the primary symptom of the most common TMD is pain, TMD also, like any musculoskeletal condition, can lead to jaw function difficulties that range from transient to permanent, from mild to severe, and from a specific isolated function affecting the individual as a whole.[6,7] However, the extent to which disability affects individuals with TMD is not easily known, and studies on this subject are relatively few. Evaluation and treatment of functional status in TMD are both necessary and challenging. However, the assessment of disability is not included in the dental practice as a whole, nor in many of the approaches used in the routine assessment of TMD. As a result, clinical diagnosis and treatment models may be insufficient to cope with disease or disability as a permanent and perhaps progressive condition. Because of this, additional treatment requirements for TMD are frequently neglected. Better characterization of chronic disease and disease-related disability of the individual may improve the diagnosis and management of TMDs. This study aims to reveal the relationship between objectively measurable symptoms in TMDs and the functional limitation and disability experienced by the patient as an effect of these symptoms. The study's primary aim was to address the relationship between the main symptoms of TMD and functional limitation and disability. The study's second aim was to reveal the possible relationship between sociodemographic characteristics and functional limitation and disability.

MATERIAL AND METHODS

STUDY DESIGN AND PARTICIPANTS

This cross-sectional study was conducted on a series of consecutive patients who applied to Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Afyonkarahisar Health Sciences University (Afyonkarahisar; Türkiye) for treatment for TMJ-related complaints between January 1 and December 31, 2023. The study was approved by Afyonkarahisar Health Sciences University Clinical Research Ethics Committee (date: November 4, 2022, no: 2022/529) and was conducted by the principles of the Declaration of Helsinki. The study procedure was explained to all participants, and informed consent was acquired from each individual.

Inclusion criteria were the presence of a painful TMD and TMD diagnosed according to Axis-1 of Diagnostic Criteria for TMD (DC/TMD).[8] Patients with systemic inflammatory rheumatic joint disease, psychiatric patients, those under the age of 18 and pregnant women were excluded from the study. All participants who filled out the questionnaires were examined by an experienced researcher in TMD.

DATA COLLECTION

The patient's socio-demographic characteristics, jaw pain, joint sounds, and maximum mouth opening (MMO) and assisted maximum mouth opening (AMMO) were recorded. The visual analog scale (VAS) was used to assess pain severity and the degree of impairment in jaw functions.[9]

The Jaw Functional Limitation Scale-20 (JFLS-20) was used to assess changes in functional limitation (Figure 1).[10] JFLS-20 scores range from 1 to 200, with higher scores indicating deteriorating jaw function. Disability status was evaluated with the Temporomandibular Disability Index (TDI).[11] TDI is a scale that evaluates whether the participants have difficulty in eating, speaking, etc. activities due to jaw joint problems. Each question in the scale is evaluated between 0 and 6 points, and high scores indicate high disability (Figure 2).

STATISTICAL ANALYSIS

Data were analyzed with SPSS for Windows, version 21.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used for sociodemographic and clinical characteristic variables. The normal distribution of the data was confirmed by the Kolmogorov-Smirnov test. Results are expressed as mean and standard deviation with a 95% confidence interval. When comparing two groups, the independent samples t-test was used, and when comparing more than two groups, the one-way analysis of variance test was employed. The relationship between numerical variables was examined using Pearson correlation coefficients.

RESULTS

The study included 381 participants (318 female and 63 male) between the ages of 18 and 70. The sociodemographic characteristics of the participants and the variation of JFLS-20 and TDI scores according to these characteristics were given in Table 1. The mean JFLS-20 score of the participants was 53.46±38.98, and the mean TDI score was 35.13±24.20.

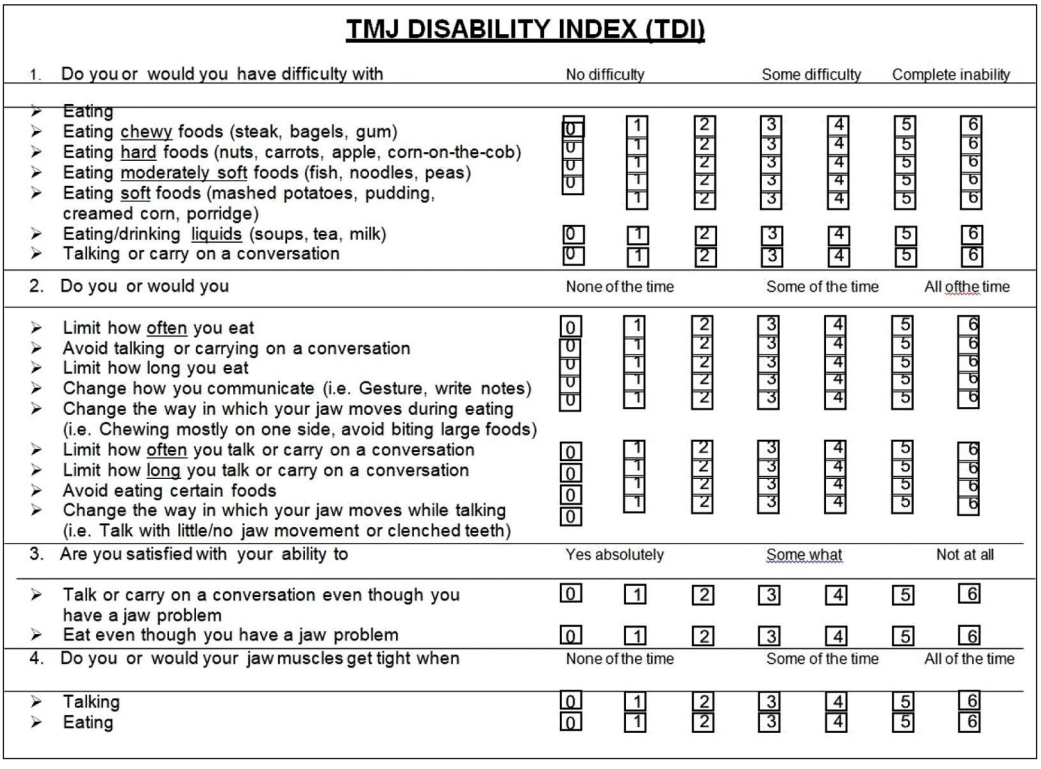
It was observed that the JFLS-20 scores of the participants differed significantly according to the participant's marital status, education level and profession. Singles had a lower JFLS-20 score than those who were married and divorced. The JFLS-20 scores of those who graduated from high school and faculty were lower than the other groups. Among the occupational groups, the highest JFLS-20 scores were seen in civil servants, followed by housewives. It was observed that the TDI scores of the participants dif-

Jaw Functional Limitation Scale – 20

For each of the items below, please indicate the level of limitation **during the last month**. If the activity has been completely avoided because it is too difficult, then circle '10'. If you avoid an activity for reasons other than pain or difficulty, leave the item blank.

		No limitation										Severe limitation
1.	Chew tough food	0	1	2	3	4	5	6	7	8	9	10
2.	Chew hard bread	0	1	2	3	4	5	6	7	8	9	10
3.	Chew chicken (e.g., prepared in oven)	0	1	2	3	4	5	6	7	8	9	10
4.	Chew crackers	0	1	2	3	4	5	6	7	8	9	10
5.	Chew soft food (e.g., macaroni, canned or soft fruits, cooked vegetables, fish)	0	1	2	3	4	5	6	7	8	9	10
6.	Eat soft food requiring no chewing (e.g., mashed potatoes, apple sauce, pudding, pureed food)	0	1	2	3	4	5	6	7	8	9	10
7.	Open wide enough to bite from a whole apple	0	1	2	3	4	5	6	7	8	9	10
8.	Open wide enough to bite into a sandwich	0	1	2	3	4	5	6	7	8	9	10
9.	Open wide enough to talk	0	1	2	3	4	5	6	7	8	9	10
10.	Open wide enough to drink from a cup	0	1	2	3	4	5	6	7	8	9	10
11.	Swallow	0	1	2	3	4	5	6	7	8	9	10
12.	Yawn	0	1	2	3	4	5	6	7	8	9	10
13.	Talk	0	1	2	3	4	5	6	7	8	9	10
14.	Sing	0	1	2	3	4	5	6	7	8	9	10
15.	Putting on a happy face	0	1	2	3	4	5	6	7	8	9	10
16.	Putting on an angry face	0	1	2	3	4	5	6	7	8	9	10
17.	Frown	0	1	2	3	4	5	6	7	8	9	10
18.	Kiss	0	1	2	3	4	5	6	7	8	9	10
19.	Smile	0	1	2	3	4	5	6	7	8	9	10
20.	Laugh	0	1	2	3	4	5	6	7	8	9	10

FIGURE 1: The Jaw Functional Limitation Scale-20.



TMJ DISABILITY INDEX (TDI)

1. Do you or would you have difficulty with	No difficulty			Some difficulty		Complete inability	
➢ Eating	0	1	2	3	4	5	6
➢ Eating chewy foods (steak, bagels, gum)	0	1	2	3	4	5	6
➢ Eating hard foods (nuts, carrots, apple, corn-on-the-cob)	0	1	2	3	4	5	6
➢ Eating moderately soft foods (fish, noodles, peas)	0	1	2	3	4	5	6
➢ Eating soft foods (mashed potatoes, pudding, creamed corn, porridge)	0	1	2	3	4	5	6
➢ Eating/drinking liquids (soups, tea, milk)	0	1	2	3	4	5	6
➢ Talking or carry on a conversation	0	1	2	3	4	5	6
2. Do you or would you	None of the time			Some of the time		All ofthe time	
➢ Limit how often you eat	0	1	2	3	4	5	6
➢ Avoid talking or carrying on a conversation	0	1	2	3	4	5	6
➢ Limit how long you eat	0	1	2	3	4	5	6
➢ Change how you communicate (i.e. Gesture, write notes)	0	1	2	3	4	5	6
➢ Change the way in which your jaw moves during eating (i.e. Chewing mostly on one side, avoid biting large foods)	0	1	2	3	4	5	6
➢ Limit how often you talk or carry on a conversation	0	1	2	3	4	5	6
➢ Limit how long you talk or carry on a conversation	0	1	2	3	4	5	6
➢ Avoid eating certain foods	0	1	2	3	4	5	6
➢ Change the way in which your jaw moves while talking (i.e. Talk with little/no jaw movement or clenched teeth)	0	1	2	3	4	5	6
3. Are you satisfied with your ability to	Yes absolutely			Some what		Not at all	
➢ Talk or carry on a conversation even though you have a jaw problem	0	1	2	3	4	5	6
➢ Eat even though you have a jaw problem	0	1	2	3	4	5	6
4. Do you or would your jaw muscles get tight when	None of the time			Some of the time		All of the time	
➢ Talking	0	1	2	3	4	5	6
➢ Eating	0	1	2	3	4	5	6

FIGURE 2: Temporomandibular Disability Index.

fered significantly according to gender, educational status and occupational status. Disability scores of women were higher than men. Similar to JFLS-20 scores, those with high school and faculty graduates had lower TDI scores. Officers had the highest TDI scores, followed by students. It was observed that the JFLS-20 and TDI scores of the participants did not differ significantly according to age and body mass index groups (Table 1).

The variation of the participants' JFLS-20 and TDI scores according to clinical symptoms was given in Table 2. As the participants' MMO and AMMO decreased, their JFLS-20 and TDI scores increased significantly ($p<0.001$). It was observed that as the pain level of the participants increased and their JFLS-20 and TDI scores increased significantly ($p<0.001$). As jaw functions decreased, JFLS-20 and TDI scores increased significantly ($p<0.001$). Those with joint noise complaints such as clicking and crepitation had higher JFLS-20 and TDI scores than those without (Table 2). In addition, in the correlation analysis, a strong correlation was observed between the MMO, AMMO, pain (VAS), and function (VAS) values of the JFLS-20 and TDI scores ($p<0.001$) (Table 3).

DISCUSSION

TMD, especially when it becomes chronic, raises the risk of complications such as mood disorders, the emergence of new pain disorders, and the vital dysfunctions that are part of disability.[12] In this study conducted in the Turkish population, the relationship between functional limitation and disability due to TMD and sociodemographic characteristics and TMD symptoms observed in patients was examined. The results of this study, which is the first to investigate the relationship between TMD symptoms and functional limitation and disability, revealed the correlation of functional limitation and disability with some sociodemographic features and main TMD clinical symptoms.

The key disability levels include pathophysiology, impairment, functional limitation, and psy-

TABLE 1: Socio-demographic characteristics and JFLS-20 and TDI scores of the participants.

	n	%	JFLS-20 $\bar{X}$±SD	p-value	TDI $\bar{X}$±SD	p-value
Gender						
Female	318	83.5	45.75±40.70	0.110	36.47±24.18	0.014*
Male	63	16.5	54.923±38.53		28.38±23.30	
Age						
<20 years old	84	22	45.81±30.01		41.85±24.88	
20-29 years old	111	29.1	55.67±40.01		33.35±22.55	
30-39 years old	96	25.2	55.65±43.86	0.391	31.81±22.34	0.050
40-49 years old	57	15	56.47±37.14		36.00±25.51	
50 and over age	33	8.7	53.27±42.67		32.18±28.41	
Marital status						
Married	186	48.8	58.93±41.09^{b}		33.91±23.82	
Single	174	45.7	45.47±32.52^{a}	0.001*	35.75±23.41	0.428
Divorced	21	5.5	70.14±53.92^{b}		40.71±32.97	
Education status						
Primary school	99	26	56.96±45.63^{bc}		34.00±22.73^{a}	
Secondary school	114	29.9	59.70±37.02^{b}	0.023*	42.86±24.78^{b}	0.000**
High school	126	33.1	49.50±39.1^{c}		31.50±24.03^{a}	
Faculty	42	11	40.64±17.39^{ac}		27.71±21.77^{a}	
BMI index						
<18.5 kg/m^2	24	6.3	43.87±27.93		35.50±20.48	
18.5-24.9 kg/m^2	201	52.8	51.45±34.69	0.220	37.04±23.93	0.401
25-29.9 kg/m^2	117	30.7	55.92±47.18		32.58±26.11	
>30 kg/m^2	39	10.2	62.23±37.26		32.69±21.48	
Occupation						
Student	23	32.3	53.60±38.68c		39.73±26.33^{cd}	
Housewife	96	25.2	59.59±40.11^{c}		35.25±22.72^{c}	
Worker	57	15	37.68±28.12^{b}		29.89±19.37^{b}	
Officer	54	14.2	80.66±40.96^{d}	0.000**	42.00±24.08^{d}	0.000**
Self-employment	18	4.7	34.00±20.41^{b}		19.50±24.82^{a}	
Retired	9	2.4	26.33±9.73^{a}		15.66±22.82^{a}	
Unemployed	24	6.3	29.37±26.09^{a}		27.12±20.36^{b}	
Total	381	100	53.46±38.98^{c}		35.13±24.20^{c}	

*p<0.005; **p<0,001; In each column, different superscripts indicate statistically significant difference between groups; JFLS-20: Jaw Functional Limitation Scale-20; TDI: Temporomandibular Disability Index; BMI: Body mass index; SD: Standard deviation.

chosocial disability, according to the IOM. "Disability" has traditionally meant a lack or reduced ability to perform an activity compared to "normal".[13] Disability is described as "difficulty in functioning at a bodily, personal, or social level encountered by an individual in one or more aspects of his or her life". Two key components make up this concept of disability: a decrease in capacity and a decrease in environmental performance. The decline in capacity is ultimately caused by biological changes at any level, from the subcellular to the tissue to the organ; the drop in performance happens at the person in the environment level. This study evaluated the relationship between the decrease in functions of TMD at the organ level and the decrease in performance in the interaction of the person with the environment. While the reductions in organ functions were expressed as "clinical findings" in the clinical examination, the decrease in the performance of the person was evaluated with the "functional limitation" and "disability" scales, and the possible relationship between these two was revealed.[14]

TABLE 2: Clinical symptoms and JFLS-20 and TDI scores of the participants.

	n	%	JFLS-20 $\bar{X}$±SD	p-value	TDI $\bar{X}$±SD	p-value
Maximum mouth opening (mm)						
<20 mm	24	6.3	106.75±31.29[d]		63.00±22.69[d]	
20-29 mm	105	27.6	62.02±35.34[c]	0.000**	42.20±22.62[c]	0.000**
30-34 mm	105	27.6	51.94±38.09[b]		35.54±23.15[b]	
35 mm and over	147	38.6	39.45±33.98[a]		25.24±20.85[a]	
Assisted maximum mouth opening (mm)						
<20 mm	12	3.2	136.00±12.57[c]		64.00±27.56[c]	
20-29 mm	51	13.5	67.05±25.54[b]	0.000**	49.35±18.93[b]	0.000**
30-34 mm	51	13.5	59.58±40.10[b]		32.82±23.73[a]	
35 mm and over	267	69.8	46.02±36.66[a]		31.67±23.38[a]	
Pain (VAS)						
<33 point	66	17.3	29.72±37.12[a]		22.95±21.32[a]	
34-76 point	168	44.1	46.67±30.89[b]	0.000**	29.60±21.92[b]	0.000**
77-100	147	38.6	71.75±39.92[c]		46.91±23.02[c]	
Function (VAS)						
<33 point	102	26.8	74.05±39.07[c]		48.35±24.83[c]	
34-76 point	162	43.3	51.77±30.83[b]	0.000**	36.74±19.28[b]	0.000**
77-100 point	114	29.9	37.44±41.28[a]		20.97±22.70[a]	
Clicking						
Yes	273	71.7	58.03±37.35	0.000**	38.79±23.51	0.000**
No	108	28.3	42.05±40.75		25.88±23.55	
Crepitus						
Yes	117	30.7	61.58±33.39	0.007**	45.10±23.67	0.000**
No	264	69.3	49.82±40.77		30.71±23.13	
Bruxism						
Yes	288	75.6	51.85±39.00	0.158	33.62±24.81	0.022*
No	93	24.4	58.41±38.69		39.80±21.67	
Total	381	100	53.46±38.98		35.13±24.20	

*p<0.005; **p<0.001; In each column, different superscripts indicate statistically significant difference between groups; JFLS-20: Jaw Functional Limitation Scale-20; TDI: Temporomandibular Disability Index; VAS: Visual analogue scale; SD: Standard deviations.

TABLE 3: Correlation of JFLS-20, TDI and some socio-demographic/clinical characteristics.

		JFLS-20	TDI	MMO (mm)	AMMO (mm)	Pain (VAS)	Function (VAS)
JFLS-20	Pearson correlation	1	0.682**	-0.408**	-0.398**	0.462**	-0.346**
	Sig. (2-tailed)		0.000	0.000	0.000	0.000	0.000
TDI	Pearson correlation	0.682**	1	-0.381**	-0.342**	0.434**	-0.450**
	Sig. (2-tailed)	0.000		0.000	0.000	0.000	0.000
MMO	Pearson correlation	-0.408**	-0.381**	1	0.916**	-0.322**	0.349**
	Sig. (2-tailed)	0.000	0.000		0.000	0.000	0.000
AMMO	Pearson correlation	-0.398**	-0.342**	0.916**	1	-0.327**	0.268**
	Sig. (2-tailed)	0.000	0.000	0.000		0.000	0.000
Pain (VAS)	Pearson correlation	0.462**	0.434**	-0.322**	-0.327**	1	-0.352**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000		0.000
Function (VAS)	Pearson correlation	-0.346**	-0.450**	0.349**	0.268**	-0.352**	1
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	
	N	381	381	381	378	381	381

*Correlation is significant at the 0.05 level (2-tailed); **Correlation is significant at the 0.01 level (2-tailed); JFLS-20: Jaw Functional Limitation Scale-20; TDI: Temporomandibular Disability Index; MMO: Maximum mouth opening; AMMO: Assisted maximum mouth opening; VAS Visual analogue scale.

There is no one "best" tool for assessing functional restriction or disability, just as there is no single "best" measure for measuring pain or depression. One measure of disability may be superior to another for a certain practice, but psychometric evaluations are crucial. The JFLS-20, in contrast, was created to more thoroughly evaluate the many dimensions in which the perceived function of the masticatory system may be jeopardized.[10,15] This scale has been used in several research. In this study, the JFLS-20 scale, which is used to evaluate functional limitations in TMD patients, was used, and it was observed that the scores of this scale differed according to some sociodemographic characteristics. The higher JFLS-20 scores of married and divorced individuals compared to singles may be due to the potential harms of stress on TMD due to the difficulties of marriage. While there was no difference between males and females in terms of JFLS-20 scores, female's TDI scores were higher than male. This is a finding consistent with the fact that female are more prone to TMD problems due to their psychological and hormonal conditions. However, there was no significant difference between age groups in terms of both functional limitation and disability.

Pain is the most common symptom of TMD and the primary reason people seek therapy.[16] Worldwide, the prevalence of TMD pain in the general population ranges between 4% and 15%.[17] It is commonly accepted that the dynamic interplay of physical, psychological, and social elements influences pain. Each person's pain experience is unique. In addition, a variety of psychological and social variables may combine with physical disease to impact a patient's symptoms and, as a result, disability.[18] In this study, as the pain level of the patients increased, both the functional limitation and disability scale scores increased significantly ($p<0.001$). This shows that pain causes disability in people with its negative effects both physiologically and psychologically. Previous research has revealed that persistent TMD pain coexists with other types of pain, including fibromyalgia, headaches, and back pain. Previous research has found that TMD patients with severe pain-related disabilities had the greatest levels of depression, somatization, sleep disruption, and anxiety.[19,20] Chronic pain can affect cognitive abilities including memory and focus, disturb sleep patterns, limit daily living activities, and restrict participation in social and other activities.

TMD, like any musculoskeletal disorder, can cause temporary to permanent, mild to severe difficulty functioning. In this study, reductions in function in TMD cases caused an increase in functional limitation and disability scores. Patients with restricted mouth opening had significantly higher JFLS-20 and TDI scores. In addition, the JFLS-20 and TDI scores of cases with TMJ sounds (click, crepitation), which is the third major symptom of TMD, were significantly higher. In this study, a strong correlation was observed between mouth opening and pain level and functional limitation and disability scores. Chronicity has a significant influence on TMD, increasing the likelihood of complications such as mood disorders, the development of additional pain diseases, and issues with living functions that are part of the disability.[6,7] As a result, assessing and treating functional status is both vital and challenging. A better definition of an individual's disability, on the other hand, can enhance diagnosis and therapy.

A large body of data supports the critical relevance of employing a biopsychosocial model to explain complex illnesses like TMD.[18,21] According to the biopsychosocial model, disease is a result of the interaction between biological processes and psychological and social elements rather than being just a biological phenomenon. Numerous studies have found that musculoskeletal problems are frequently associated with problems with life functioning, particularly when chronicity is present, and because once these issues arise, they may no longer be seen as only a result of the sickness but also as factors in the development of the illness.[14] The masticatory system supports talking, smiling, and swallowing with a number of connected components, and these nonchewing activities' physiology is closely related to that of the masticatory system. When compared to healthy controls, Karacayli et al. reported that chronic TMD pain patients with disc displacement with reduction had more problems with jaw function, in-

cluding smiling, cleaning their teeth or face, and speaking.[22] However, in a cross-sectional study, no association was found between TMJ intra-articular status and the TMD effect represented by pain, jaw function, and disability.[23] In contrast, limitations and disability have been shown to occur in TMD disorders, as the results of this study suggest, but our treatments for such conditions are mostly general and not dependent on these restrictive concepts. A clinical assessment model that combines information from limitation and disability with pathophysiology and impairment is necessary for an easier understanding of the complaint. Knowing the prognosis of TMD symptoms and their possible impact on the patient can assist the clinician in the treatment process. For example, it may be thought that patients with severe disorders are the worst responders to treatment, while those with low levels of impairment may benefit from even the "simple" cognitive-behavioral therapy regimen and respond better to treatment.

Evaluation of functional limitation and disability in TMD cases using only the JFLS-20 and the TMD disability index is a limitation of the study. Another limitation of the study is that the deterioration in TMD was evaluated only by clinical findings and the absence of a control group in the study. Despite these limitations, this is the first study in the Turkish community to investigate the association between functional restriction and disability scores and clinical results.

CONCLUSION

Study findings showed that organ-level impairment and pathophysiologies are strongly associated with functional limitation and disability in TMD. In the study, it was observed that as the severity of TMD symptoms increased, functional limitation and disability scores increased significantly. When evaluating patients, clinicians should consider clinical findings as well as functional limitations and disability, which are the reflections of these findings in individuals. Evaluating clinical findings together with functional limitation and disability in TMD cases may improve the diagnosis and treatment of TMD.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

This study is entirely author's own work and no other author contribution.

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